WHAT IS CLAIMED IS:

1. A method for infiltrating an organic material into spaces in one or more nanostructures, comprising:
disposing the organic material proximate the nanostructures; and
exposing the organic material to a solvent vapor.

2. The method of claim 1 wherein disposing the organic material proximate the nanostructures includes disposing a layer of a polymer process solution on a nanostructured template.

3. The method of claim 2 wherein the nanostructured template has spaces between about 5 nm and about 1000 nm wide.

4. The method of claim 2 wherein the spaces in the nanostructured template include tubes between about 1 nm and about 1000 nm in diameter with a tube density between about 10^{12} tubes/m^2 and about 10^{16} tubes/m^2.

5. The method of claim 1, wherein the nanostructures include one or more nanopores, cavities, or interstitial spaces between pores, tubes or rods.

6. The method of claim 5 wherein disposing the organic material proximate the nanostructures includes mixing the nanotubes into a polymer process solution.

7. The method of claim 1 wherein the organic material is a small molecule.

8. The method of claim 1 wherein the organic material is a pigment, dye or fullerene.

9. The method of claim 1 wherein the organic material is a polymer.

10. The method of claim 9 wherein the polymer includes one or more polymers selected from the group of poly(phenylene) and derivatives thereof, poly(phenylene vinylene) and derivatives thereof (e.g., poly(2-methoxy-5-(2-ethyl-hexyloxy)-1,4-phenylene vinylene (MEH-PPV), poly(para-phenylene vinylene), (PPV)), PPV copolymers, poly(thiophene) and derivatives thereof (e.g., poly(3-octylthiophene-2,5,-diyl), regioregular, poly(3-octylthiophene-2,5,-diyl), regiorandom, poly (3-hexylthiophene) (P3HT), poly(3-hexylthiophene-2,5-diyl), regioregular, poly(3-hexylthiophene-2,5-diyl), regiorandom), MDMO, poly(thienylenevinylene) and derivatives thereof, and poly(isothianaphthene)

and derivatives thereof, tetra-hydro-thiophene precursors and derivatives thereof, poly-phenylene-vinylene and derivatives organometallic polymers, polymers containing perylene units, poly(squaraines) and their derivatives, discotic liquid crystals polyfluorenes, polyfluorene copolymers, polyfluorene-based copolymers and blends, e.g. co-polymerized and/or blended with materials such as charge transporting (e.g. tri-phenyl-amines and derivatives) and/or light-absorbing compounds (e.g. fused thiophene rings and derivatives, generally hetero-atom ring compounds with or without substituents), and/or fullerenes, dyes or pigments.

11. The method of claim 10 wherein solvent vapor includes chloroform is selected from the group of acetone, chloroform, benzene, cyclohexane, dichloromethane, ethanol, diethyl ether, ethyl acetate, hexane, methanol, toluene, xylene, mixtures of two or more of these, and derivatives of one or more of these.

12. A method for making an optoelectronic device, comprising:
providing a nanostructured template having spaces between one or more nanostructures;
infiltrating an organic material into the spaces by disposing the organic material proximate the nanostructures and exposing the organic material to a solvent vapor; and
placing the nanostructured template and or organic material in electrical contact with an electrode.

13. The method of claim 12 wherein disposing the organic material proximate the nanostructures includes disposing a layer of an organic process solution on a nanostructured template.

14. The method of claim 12 wherein the spaces in the nanostructured template include tubes between about 1 nm and about 1000 nm in diameter with a tube density between about 10^{12} tubes/m^2 and about 10^{16} tubes/m^2.

15. The method of claim 12 wherein the organic material includes small molecules.

16. The method of claim 15 wherein the small molecules include pentacene or pentacene precursors.

17. The method of claim 12 wherein the organic material is a pigment, dye or fullerene.

18. The method of claim 12 wherein the organic material is a polymer.

19. The method of claim 18 wherein the polymer includes one or more polymers selected from the group of poly(phenylene) and derivatives thereof, poly(phenylene vinylene) and derivatives thereof (e.g., poly(2-methoxy-5-(2-ethyl-hexyloxy)-1,4-phenylene vinylene (MEH-PPV), poly(para-phenylene vinylene), (PPV)), PPV copolymers, poly(thiophene) and derivatives thereof (e.g., poly(3-octylthiophene-2,5,-diyl), regioregular, poly(3-octylthiophene-2,5,-diyl), regiorandom, poly (3-hexylthiophene) (P3HT), poly(3-hexylthiophene-2,5-diyl), regioregular, poly(3-hexylthiophene-2,5-diyl), regiorandom), MDMO, poly(thienylenevinylene) and derivatives thereof, and poly(isothianaphthene) and derivatives thereof, tetra-hydro-thiophene precursors and derivatives thereof, poly-phenylene-vinylene and derivatives organometallic polymers, polymers containing perylene units, poly(squaraines) and their derivatives, discotic liquid crystals polyfluorenes, polyfluorene copolymers, polyfluorene-based copolymers and blends, e.g. co-polymerized and/or blended with materials such as charge transporting (e.g. tri-phenyl-amines and derivatives) and/or light-absorbing compounds (e.g. fused thiophene rings and derivatives, generally hetero-atom ring compounds with or without substituents) , and/or fullerenes, dyes or pigments.

20. The method of claim 12 wherein solvent vapor is selected from the group of acetone, chloroform, benzene, cyclohexane, dichloromethane, ethanol, diethyl ether, ethyl acetate, hexane, methanol, toluene, xylene, mixtures of two or more of these, and derivatives of one or more of these.